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| 10/549,753 | 09/21/2005 | Sumie Suda | 278290US0XPCT | 1304 |
| 22850 | 7590 | 06/10/2010 | EXAMINER | |
| OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. | | | FOGARTY, CAITLIN ANNIE | |
| 1940 DUKE STREET | | | | |
| ALEXANDRIA, VA 22314 | | | ART UNIT | PAPER NUMBER |
| | | | 1793 | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | |
|------------------------------|--------------------------------------|------------------------------------|
| Office Action Summary | Application No. 10/549,753 | Applicant(s) SUDA ET AL. |
| | Examiner CAITLIN FOGARTY | Art Unit 1793 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If no period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 February 2010.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-7 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-7 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____

4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____

5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on February 22, 2010 has been entered.

Status of Claims

2. Claims 1 – 7 are pending where claim 7 is new. No claims have been amended.

Status of Previous Rejections

3. The 35 U.S.C. 103(a) rejection of claims 1 – 6 as being unpatentable over Hashimura et al. (US 6,338,763 B1) in view of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" from the *Metals Handbook Desk Edition* has been maintained.

The provisional nonstatutory obviousness-type double patenting rejection of claims 1 and 2 as being unpatentable over claims 1 – 14 of copending Application No. 10/550,019 has been withdrawn because Application No. 10/550,019 is now US 7,615,186 B2 so the rejection is no longer provisional.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

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5. Claims 1 – 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hashimura et al. (US 6,338,763 B1) in view of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" from the *Metals Handbook Desk Edition*.

In regards to instant claims 1 and 4, the abstract, col. 2 line 13 – col. 4 line 14, and Table 4 Example 22 of Hashimura disclose a steel wire for high-strength springs having superior workability, the steel wire having tempered martensite, with a clearly overlapping composition as shown in the table below.

| Element | Claim 1 (mass %) | Hashimura et al. (mass %) | Overlapping Range (mass %) |
|----------------------|---|--|--|
| C | 0.53 – 0.68 | 0.4 – 0.7 | 0.53 – 0.68 |
| Si | 1.2 – 2.5 | 1.2 – 2.5 | 1.2 – 2.5 |
| Mn | 0.2 – 1.5 | 0.1 – 0.5 | 0.2 – 0.5 |
| Cr | 1.4 – 2.5 | 0.4 – 2.0 | 1.4 – 2.0 |
| Al | 0 < Al ≤ 0.05 | 0.0001 – 0.005 | 0.0001 – 0.005 |
| Ni, V, Mo, and/or Nb | 0 < Ni ≤ 0.4 0 < V ≤ 0.4 0.05 – 0.5 Mo 0.05 – 0.5 Nb | 0.1 – 2.0 Ni 0.050 – 0.4 V 0.1 – 2.0 Mo 0.005 – 0.05 Nb | 0.1 – 0.4 Ni 0.050 – 0.4 V 0.1 – 0.5 Mo 0.05 Nb |
| Fe + impurities | Balance | Balance | Balance |

Hashimura also discloses that the ratio ($\sigma_{0.2}/\sigma_B$) of 0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) is not less than 0.8 and not greater than 0.9. This overlaps with the ratio ($\sigma_{0.2}/\sigma_B$) recited in claim 1 of 0.85 or lower.

Hashimura differs from instant claim 1 because it does not specifically teach that the steel wire has a prior austenite grain size number of 11.0 or larger. However, it would have been obvious to one of ordinary skill in the art to minimize the prior austenite grain size as much as possible as evidenced by p. 5 of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" because an increased prior

austenite grain size may have a detrimental effect on resistance to fatigue cracking of the steel wire for a high-strength spring.

Claim 2 narrows the composition of Mn to 0.5 – 1.5 mass% which has an overlapping range of 0.5 mass % with the steel of Hashimura.

In regards to claim 3, Hashimura does not disclose the steel wire according to claim 1, wherein the 0.2% proof stress ($\sigma_{0.2}$) is raised by 300 MPa or more when annealing at 400°C for 20 minutes is conducted. However, that is a product-by-process limitation which does not have patentable weight in this case because it does not impart any additional structural limitations to the claimed product. See MPEP 2113. Therefore, since Hashimura discloses an overlapping composition and a ratio ($\sigma_{0.2}/\sigma_B$) that overlaps with the ratio recited in claim 1, it would be expected that the 0.2% proof stress ($\sigma_{0.2}$) of the steel of Hashimura would be raised by 300 MPa or more when annealing at 400°C for 20 minutes is conducted.

Hashimura in view of the *Metals Handbook* differs from instant claim 5 because it does not specifically teach that the high-strength spring has a core part of a hardness Hv ranging from 550 to 700, a compressive residual stress on a surface thereof at -400 MPa or lower; or that the residual stress of the spring is changed from a compression to a tension at a depth of from 0.05 mm to 0.5 mm from the surface of the spring. However, one of ordinary skill in the art would have expected the high-strength spring of Hashimura in view of the *Metals Handbook* to have a similar core hardness, compressive residual stress, and relationship between residual stress and depth from

the surface because the spring of Hashimura in view of the *Metals Handbook* has an overlapping composition and is made using a similar method. See MPEP 2112.

Regarding instant claim 6, col. 2 lines 3 – 25 of Hashimura disclose a spring made from a steel wire with an overlapping composition with that of claim 1 that has a nitriding layer on the surface. Hashimura in view of the *Metals Handbook* differ from instant claim 6 because they do not specifically teach that the spring has a hardness Hv ranging from 750 to 1150 on the surface, a core part of a hardness Hv ranging from 550 to 700, a hard layer of a hardness Hv larger than the hardness of the core part by 15 or more, the hard layer having a depth ranging from 0.02 mm to 0.15 mm, a compressive residual stress on a surface thereof at –800 MPa or lower, or that the residual stress of the spring is changed from a compression to a tension at a depth of from 0.05 mm to 0.5 mm from the surface of the spring. However, one of ordinary skill in the art would have expected the high-strength spring of Hashimura in view of the *Metals Handbook* to have a similar surface hardness, core hardness, hard layer hardness, compressive residual stress, and relationship between residual stress and depth from the surface because the spring of Hashimura in view of the *Metals Handbook* has an overlapping composition and is made using a similar method. See MPEP 2112.

Hashimura in view of the *Metals Handbook* differ from instant claim 7 because they do not specifically teach that when the spring is subjected to a fatigue test under a load stress of 760 ± 650 MPa at a temperature of 120°C, the spring is capable of undergoing ten million cycles without breakage. However, one of ordinary skill in the art would have expected the high-strength spring of Hashimura in view of the *Metals*

Handbook to be capable of undergoing ten million cycles without breakage when subjected to a fatigue test under a load stress of 760 ± 650 MPa at a temperature of 120°C because the spring of Hashimura in view of the *Metals Handbook* has an overlapping composition and is made using a similar method. See MPEP 2112.

Since the claimed compositional ranges for claims 1 – 7 either overlap or are within the ranges disclosed by Hashimura, a *prima facie* case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed steel wire composition from the steel wire composition disclosed by Hashimura because Hashimura teaches the same utility (i.e. high-strength springs) in the whole disclosed range.

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 1 – 7 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 – 14 of U.S. Patent No. 7,615,186 B2 in view of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" from the *Metals Handbook Desk Edition*.

Since the instant claimed compositional ranges either overlap or are within the ranges recited in U.S. Patent No. 7,615,186 B2, a prima facie case of obviousness exists. See MPEP 2144.05. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the claimed steel composition from the steel composition recited in U.S. Patent No. 7,615,186 B2 because U.S. Patent No. 7,615,186 B2 teaches the same utility (i.e. a steel for a spring) in the whole disclosed range. U.S. Patent No. 7,615,186 B2 does not recite that the steel comprises tempered martensite, has a prior austenite grain size of 11.0 or larger, and has a ratio ($\sigma_{0.2} / \sigma_B$) of

0.2% proof stress ($\sigma_{0.2}$) to tensile strength (σ_B) in the steel wire of 0.85 or lower. However, since the steel and high-strength spring of U.S. Patent No. 7,615,186 B2 have an overlapping composition with that of the instant claims and are made using a method similar to that of the instant claims, one of ordinary skill in the art would have expected the spring steel of U.S. Patent No. 7,615,186 B2 to have similar physical properties. Furthermore, it would have been obvious to one of ordinary skill in the art to minimize the prior austenite grain size as much as possible as evidenced by p. 5 of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" because an increased prior austenite grain size may have a detrimental effect on resistance to fatigue cracking of the steel wire for a high-strength spring.

Response to Amendment

8. The declaration under 37 CFR 1.132 filed December 22, 2009 is insufficient to overcome the rejection of claims 1 – 6 based upon Hashimura in view of "Fracture Toughness Properties-Effects of Microstructure and Heat Treatment" from the *Metals Handbook Desk Edition* applied under 35 U.S.C. 103(a) as set forth in the last Office action because the declaration does not provide sufficient evidence to demonstrate unexpected results. The Declaration only provides one test steel with a ratio of 0.2% proof stress to tensile strength of 0.861 and a prior austenite grain size number of 12.0. It appears to the Examiner that Applicant is attempting to demonstrate unexpected results for a steel with the combination of a ratio of 0.2% proof stress to tensile strength in the steel wire of 0.85 or lower and a prior austenite grain size of 11.0 or larger that will result in a steel with an unexpectedly high fatigue life. However, Applicant has

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provided only one data point to demonstrate this unexpected result and therefore the unexpected results are not commensurate in scope with the claimed invention. See MPEP 716.02(d). Applicant claims a prior austenite grain size number of 11.0 or larger which is a very broad range and includes values much larger than 12.0. Similarly, the claimed ratio of 0.2% proof stress to tensile strength of 0.85 or lower includes several other values. Thus, the showing of unexpected results does not occur over the entire claimed range.

Response to Arguments

9. Applicant's arguments filed December 22, 2009 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

Applicants have conducted experimentation, set forth in the Declaration under 37 CFR 1.132 to demonstrate that the Office Action's assumptions about whether and how one of ordinary skill in the art would have modified the steel of Hashimura are incorrect. The results in the Declaration demonstrate that a steel composition according to Hashimura modified to have a prior austenite grain size as recited in claim 1 yields springs having a far inferior fatigue life in comparison to springs obtained from steel compositions as recited in claim 1. Therefore, one of ordinary skill in the art would have had no reason to expect that the steel of Hashimura would have desirable resistance to fatigue cracking if modified to increase the prior austenite grain size number. Applicants also note that the experimental results in the Declaration demonstrate that springs formed from the

steel composition of Hashimura, even if modified to have the prior austenite grain size of claim 1, do not necessarily have the fatigue strength recited in claim 7.

Examiner's response is as follows:

The Examiner has explained above under "Response to Amendment" that the Declaration does not provide sufficient evidence to demonstrate unexpected results. Therefore, the Examiner maintains the *prima facie* case of obviousness set forth in the above rejections in the absence of factual evidence to the contrary that is commensurate in scope with the instant claims.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CAITLIN FOGARTY whose telephone number is (571)270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Roy King/
Supervisory Patent Examiner, Art
Unit 1793

CF